Fatty acid esters enzymatic production for food applications

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Biosurfactants have several advantages over the chemical surfactants, such as lower toxicity, higher biodegradability (Zajic et al., 1977), better environmental compatibility (Georgiou et al., 1992), higher foaming (Razafindralambo et al., 1996), high selectivity and specific activity at extreme temperatures, pH, and salinity (Velikonja and Kosaric, 1993), and the ability to be synthesized from renewable feedstock (Desai and Banat, 1997). Several experiments were done aiming at the study on the enzymatic esterification of the oleic acid with fructose in ethanolic medium, focusing the synthesis of biodegradable biosurfactants. Many chemical surfactant molecules contain ester or amide linkages and are amenable to chemoenzymatic synthesis using microbial and other lipases or proteases. These enzymes typically act in nature as biodegradative hydrolases but can be exploited in bioorganic synthesis reactions by implementing the biocatalysis in low water environments which shift reaction equilibria to favour synthesis rather than hydrolysis (Singh et al., 2007). For that purpose, it was utilized the enzyme, *Candida antartica* B., at temperature of 55 ºC, in reacting time of 48, 72, 96 e 120 hours. Accordingly to the obtained results it was verified that the related enzyme catalyzed primarily the ethanol present in the reactional medium to form the ester: ethyl oleate. This fact was confirmed through magnetic nuclear resonance spectra (^{1}H and ^{13}C) as well as, through infrared spectrum, by the presence of absorption peak at 1738,4 cm^{-1}, characteristic of that ester. The results of the reaction of ethyl oleate production indicate that the highest yield was observed in about 96 hours time, and for the 120 hours time it was observed also an inferior yield. The experiments accomplished for the obtention of fructose esters from oleic acids in ethanolic medium were not successful like in other solvents not recommended for food use. The ethyl oleate shows a lipophilic character and in the food industry it finds application in the osmotic dehydration of tomatoes and peppers "dedo de moça", improving water release, sugar yield and solar brightness. The use of ethyl oleate in the dehydration process decreases the drying time and increases its efficiency without leaving any traces of chemical residues.

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